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ABSTRACT

A symposium on schools as part of a network of learning facilities took place in Segovia, Spain, in December 1986. Participants from 14 Organisation for Economic Cooperation and Development (OECD) member countries met to share the implications of network cooperation for educational buildings and their management. The physical isolation of schools from each other and from the communities which they serve is increasingly being challenged. New links between education and industry, the growing importance of lifelong learning, and the potential of new information technology all serve to increase the interdependence of schools and other educational and social institutions. The report draws together the main strands of the wide-ranging discussion at the symposium and identifies the opportunities offered by networking. The report assesses the impact networking may have on educational building policy and practice and in particular the financial advantages of sharing high-cost facilities. The appendix contains the text of the background paper written for the symposium by John Mayfield, then deputy director-general for education, South Australia. This paper traces the development of networking and gives several examples of the practical questions associated with its implementation. Also appended is an annotated list of the 22 papers presented at the symposium. (MLF)

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SCHOOLS AS PART OF A NETWORK OF LEARNING FACILITIES
IMPLICATIONS FOR EDUCATIONAL BUILDING

Conclusions of a Symposium in Segovia, Spain
1 - 4 December 1986

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SCHOOLS AS PART OF A NETWORK OF LEARNING FACILITIES
IMPLICATIONS FOR EDUCATIONAL BUILDING

Conclusions of a Symposium in Segovia, Spain
1 - 4 December 1986

by

James Linn

The PEB symposium on schools as part of a network of learning facilities took place in Segovia, Spain, from 1st to 4th December 1986. Participants from 14 OECD Member countries met to share experience of the implications of network co-operation for educational buildings and their management. The physical isolation of schools from each other and from the communities which they serve is increasingly being challenged. New links between education and industry, the growing importance of lifelong learning, and the potential of new information technology, all serve to increase the interdependence of schools and other educational and social provision.

The present report has been written by the Rapporteur of the symposium, Mr. James Linn, formerly Assistant Secretary, Scottish Education Department. It sets out to draw together the main strands of the wide-ranging discussion at the symposium, and to identify the opportunities offered by networking. It assesses the impact it may have on educational building policy and practice and in particular the financial advantages of sharing high-cost facilities. The report should be regarded as the Rapporteur's personal summary of the symposium rather than that of the organisers, participants, or the OECD. Nevertheless, the Secretariat believes that those who attended the symposium will find in it a broad reflection of the views which were expressed.

Annexed to the report is the text of the background paper written for the symposium by Mr. John Mayfield, then Deputy Director-General for Education, South Australia. This paper traces the development of networking and gives several examples of the practical questions associated with its implementation.

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WHY NETWORKS?

An educational planner sees education developing over time: events take place (e.g. fall in pupil numbers; surplus accommodation; new technology), new policies are created (e.g. curriculum developments; changes in age groups; decentralisation) and all have building implications. The planner or policy-maker identifies the problems which such change brings and searches for solutions. In turn the 'solution' may bring other 'problems' ... sometimes the solutions may present fresh educational or building opportunities.

According to the 17th century English writer, John Donne '... no man is an island ...' each of us is in fact part of a continent with all that that implies in terms of contact with and dependence on others. By the same analogy, for many years the impression has been maintained that each school is an island - and for that matter that formal education itself is an island. Each is self-sufficient and requires no outside contact to carry out its role. Of course few educators would admit this and many would vehemently deny it, but the politics and the management of the education system has in practice been designed around this notion of self-sufficiency, and very many of our schools have been designed, built and run, each as an 'island'.

The self-sufficient school or education system has persisted for a very long time during a period when education itself was a relatively static and traditional learning system in most OECD countries. The spread of modern communications systems, rapid economic change and the growing pressure to control public expenditure (which includes expenditure on education) in the interests of national economic policy all contribute to an examination of the ways in which education is delivered. Several other trends also contribute to this examination, such as the interest in education beyond the post-compulsory stage and the link between general education and vocational training; endemic unemployment which encourages greater staying-on rates; better co-operation between education and industry and the growing realisation that education is a life-long process which needs new and very different delivery systems. There is also a movement towards more community involvement in the education process; the greater involvement of parents in decision-making and better use of publicly provided facilities. These are social changes and there is finally - in this brief catalogue - technological change which has brought new technology such as computers, video and broadcasting to help extend and improve the communication process. All of these changes have caused educational planners to re-think the ways in which educational facilities are delivered and in many cases a solution has been to share or link facilities - to form a network. But the most telling of these influences can be summed up in the phrase "a better use of resources". The word 'resources' appears several times in this report because networking frequently offers solutions which make good use of them.

On the educational time-continuum PEB has charted the movement away from the 'island' concept and the symposium noted the reasons for this change, identified the potential benefits and highlighted the fresh problems to be solved. If you like, this is the examination of evolution in action. It does not really matter if we describe this move away from the island, from self-sufficiency, as networking. Networking is a useful term to describe the

idea of 'sharing'; the background paper for the symposium which is reproduced as Annex A gives one view of its origin and potential. It does not matter if we do not define 'networking' (and perhaps to do so may be confining) but if it makes it easier to grasp the concept and the substance of the symposium, here are two definitions - short and long - devised by different working groups.

"Networks are formal or informal arrangements on a large or small scale under which educational units share resources and facilities in co-operation with each other, other people, agencies or institutions in order to maximise opportunities or to achieve the best solution to identified needs. A given unit or institution may be involved simultaneously in several different networks".

"Networking is making the best use of resources through sharing or linking with educational or other facilities".

In one respect, we should not have defined networking at this early stage in this report because these formulations were the outcome of much discussion. There is no simple answer to the question "what is networking?" It is something which evolves from the detailed consideration of such questions as "What shall I do about this changed situation?" "How can I cope with the demands which are arising and will arise in the future?" It is both a way to finding solutions to recognised problems and an opportunity presented by new circumstances.

CHANGING CIRCUMSTANCES

Each country, indeed each locality, faces a different set of circumstances of resources, enrolments, and curricular and educational policy developments but there was nonetheless a considerable measure of agreement on the nature of those which have led to networking. The two main factors are the pace and scale of change, and resource constraints. We will now look at some of these changing circumstances in greater detail with examples drawn from the many papers presented at the symposium by participants (a list of these is to be found in Annex B).

Reorganisation of an educational system

One very clear example of change which was available in Segovia, was that of Spain itself which is taking the opportunity of a new form of government to decentralise and reform many parts of its educational system. Change itself provides the right atmosphere for experiment and ideas and, as new authorities obtain educational responsibilities for the first time, there is evidently an eagerness to give the public at local level the best possible facilities within the resources available. There are never enough resources to effect rapid change and therefore new ideas for the sharing of facilities can be attempted. Several of the papers or aspect studies from Spanish participants gave good examples, such as those describing the new local authority co-ordination of the network of State schools in Getafe; similar planning in Zaragoza; and the sharing of resources in the rural area of Ballobar.

Life-long education

This is a general term in this context employed to cover that growing trend in education systems in many countries to provide wider educational opportunity beyond the compulsory stage of education. Included is the movement in some countries towards greater inter-relation between 'academic' and 'vocational' education; the link with job training; the opportunity to up-date knowledge and skills; extending the use of school buildings etc., to the adult community for leisure use and adult and community education. For adults education is not compulsory and very often not easy, because of physical inconvenience, or administrative or psychological barriers. Networking can make provision for adults first, more accessible, and second, by facilitating the combination of courses and modules, more worthwhile and more attractive.

There are thus many opportunities in this field and we had good examples from symposium participants, including the account of the Abraham Moss Centre at North Manchester College in England. Indeed this Centre was so multi-functional that it provided examples of networking in almost every category. Readers are invited to obtain further details from the Principal of the College. Reference will be made again to this Centre in the context of the management of resources, but it was yet again an example of the truth that change generates innovation, which in turn finds ways to break down administrative or financial barriers. Other good examples came from the town of Lahti in Finland, and the paper on adult education in Murcia, Spain.

The education/industry interface

When pupils are approaching the end of compulsory education, there is the opportunity to choose between academic and vocational education even if the boundary between the two is becoming blurred in many countries. In the field of technical and vocational education local employers increasingly are making known their needs for education and training of young people - whether in commerce, technology, mechanics, agriculture or tourism (hotels and catering) - and in many cases partnerships have been struck between schools, colleges and local employers. One of the benefits of such co-operation is the sharing of expertise and facilities. It is not necessary for example for a college to purchase expensive equipment since it can use what is available - and right up-to-date - on company premises. And companies can have access to professional teachers to enrich their training programmes.

Several good examples of this factor for change were brought to our attention by symposium members such as the engineering technology centre built in the Karlskrona area of Sweden by the Uddcomb company which specialises in advanced technology for nuclear power, offshore oil and processing. Facilities and equipment of the latest and most sophisticated kind are made available for the training and up-dating of adult students. Similarly, also in Sweden at the town of Ljungby there is a "workshop resources centre" located at the upper secondary school (for pupils in the 16-19 age range). This serves as a pool for spreading new technical information to smaller companies in the area and stimulates co-operation between school and local industry (which contributes financially). Other examples came from Turkey and Spain of the way in which the use of industrial and hotel facilities are used as part of formal vocational education.

New technologies

Increasingly over the last five years or so and on into the future, the arrival of new technological means of providing information and communication will perhaps more than anything bring an end to the 'school as an island' concept. There are two angles to this: one is that resources centres will spring up to provide data-bases, software, information packs, broadcast and video material, computer training, repair and other centralised facilities, to a network of schools and colleges. The second is that the technology itself provides a means of linking more readily schools whether they be urban or remote by various means such as telephone-linked data bases and computers and through school radio and television broadcasts and narrow-casts.

The computerised network can also be adopted for administrative purposes as shown in the paper on the Australian Capital Territory Schools Authority network of administrative computing facilities for over 100 schools - most of which are within 25 km of the Computer Centre. In Scotland, the Scottish Council for Educational Technology in Glasgow is a resource centre for the preparation and supply of free educational software for all Scottish school computers, including a standard administration package. On a local basis we have the example already mentioned of the Abraham Moss Centre in England which provides an information technology network and open learning material, and Alford in Scotland where a purpose-built technology resources centre at a secondary school serves not only the school but the local community and the feeder primary schools, some of which are very small. The case of Holland College, Prince Edward Island, Canada, a description of which has recently been published by PEB, also deserves mention as an example of individualised learning based on a combination of new information technologies. (1)

Social change

This category includes demographic change - rise and fall in pupil and student numbers due to changing birthrates or migration - and also the social change brought about by, for example, severe and chronic unemployment. It also includes the opening up of school and college facilities to the community and the greater involvement of the community, particularly parents, in educational affairs. All of these changes bring about the need for new styles, new approaches to the delivery of education. It makes sense for schools in this situation to link with others and with other social services and to share facilities for the wider spread of participants, or in some cases to share scarce resources. A good example provided at the symposium is the Rotterdam "Oude Westen" district - a densely populated city centre area of 12 000 inhabitants with a majority of immigrants. There, the three schools and other medical and social services are shared as a network of facilities. See also the Lahti (Finland); Zaragoza (Spain) and Abraham Moss (England) papers previously mentioned.

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1. Graham Parker, "Individual Learning - Holland College, Prince Edward Island", Long-term Perspectives No. 4, OECD/PEB, Paris, 1987.

Curriculum change

Recently and over the next few years several countries will be making radical reappraisals of school and college curricula. The movement will be to teaching in modules, with continuous assessments and carry-over and accumulation of credits into the years beyond compulsory education - which will make life-long education a practical reality. The new system will be more pupil-oriented and of the problem-solving style of learning, taking full advantage of open-learning techniques and technology. This in due course will have a profound effect on the use and location of resources including buildings. Scotland is already going through this curriculum change stage with two noticeable effects, viz national resource centres for teaching materials and the sharing of scarce teaching resources by linking schools into consortia.

Resource shortages

This includes shortage of money (for capital or running costs), buildings, equipment, space or teachers. There are many local examples of the way facilities have been shared particularly in such obvious areas as sports and recreational facilities (games halls, swimming pools, outdoor tracks and pitches, etc.); music, art and drama; catering (including central kitchens); libraries and resource centres and technical and computer facilities. An example is at Golden Grove in South Australia, where three new secondary schools will be built in a campus so that wherever possible common facilities can be shared. One advantage of this planned approach is that high-cost facilities can be afforded which might not be possible if each school was a separate entity. The report on the seminar "School - an isolated undertaking" organised by the Austrian Institute for School and Sports Facilities is particularly relevant to the above paragraphs.

IMPLEMENTING NETWORKING

The circumstances outlined above are highlighted as the major situations in which educational planners find that networking is a solution to a new problem. In providing that solution it is important to ensure that optimum advantage is gained from the change. Networking has a number of potential advantages - and these are not necessarily in order of importance - improved quality of learning; benefits to the pupil; 'value for money' in other words, cost effectiveness; improved efficiency; extended educational opportunities; community investment; shared scarce resources and greater decentralisation. Networking is worth deploying if it brings some of these benefits, but it will only do so if it is carefully planned. Networking is an intricate process and there are a number of potential problems to consider.

Transport

In considering the problem of moving pupils or teachers from one location to another it became obvious that in many cases the facilities should be moved or transported to the users rather than vice-versa. The term mobility therefore was used instead of transport. When the problem is looked

at in this way it can be seen that the number of options is doubled, if not further multiplied. The recommendation was that young children should not be transported other than for short distances and therefore vehicular movement should as far as possible be confined to older pupils and teachers. Careful attention in such cases must be given to avoiding excessive travel time; the supervision and safety of students; the frequency of interruptions of study-time and the educational and psychological need for a secure 'home' school-base. Wherever possible and particularly for young children in rural areas, the effort should be made to provide - probably by technological means such as computer; radio or telephone link; or broadcasting - facilities in situ for such pupils.

School identity

It is important, particularly where there is movement of pupils or substantial sharing of common services, that pupils should be encouraged through good organisation and management to identify themselves with their schools. It was argued that pupils need this feeling of 'belonging' to a school or a community and that it can be encouraged, despite networking, for example, by generating healthy inter-school rivalry which nevertheless should not become aggressive competition. This will require sympathetic guidance by tutors and, if possible, by careful planning of the built environment.

Time-tabling

It should be fairly obvious that time-tabling the use of classrooms, laboratories and other specialist facilities in schools where there is a networking arrangement will be more complicated than in 'stand-alone' schools. It is not just a logistical problem - which good computing facilities could readily solve - but there is also the human element to consider. The personnel involved, mainly teachers, but also of course pupils, must be taken into account. In general it may be that varying lengths of time-table period will be required - for example longer blocks of time-tabling for those having to travel. With the growth of networking, the changes in curriculum and teaching practice, the new opportunities for open learning and educational use of computers, and the increasing computerisation of time-tabling, a recommendation is that there should be a major reappraisal of the concept of the time-table. This is not a PEB problem, but it was suggested that perhaps OECD or some other international educational agency could accept this task.

Management

The problem of management must be overcome if networking is to be successful, and solutions need to be envisaged and in place before networking is attempted. The symposium, rightly, devoted much attention to this aspect and the four discussion groups came up with remarkably similar answers. Because networking by its very nature can be so many different ways of linking and sharing, it is not possible to define a general management style. Traditional bureaucratic methods may not be suitable, although it may be the decision in some countries to enforce co-operation by statute. The general opinion however is that management should be a balance between formal and

informal: almost certainly some sort of legal framework, perhaps in contractual form, with the areas to be managed clearly defined will be necessary. The central government role should be to encourage, offer financial incentives and assist with organisational change, planning and ideas.

This implies that management should be decentralised - to the lowest practicable level and in such a fashion as to embrace the community of users so that they have a voice in the management of the facilities. There is a danger to be guarded against: where resources are shared out from a central source the creation of networks embracing a number of establishments could lead to a recentralisation on the grounds of equity, and the weakening of decentralised management.

Since in many circumstances a network will mean the bringing together of a number of elements which already had a separate existence, some elements in the link will be giving up control or independence. This will mean a change in attitudes, a need for goodwill on all sides and a spirit of co-operation. The networkers must know why the system is in operation, who is responsible for what, and how it all fits together, and this means training, the provision of better information and wide-spread publicity. Incentives will be required and good ideas and initiatives should be rewarded. Planning and marketing will also be necessary. Muddle and uncertainty will destroy goodwill and the willingness to innovate and make it less likely that new ventures will be attempted in future. The actual management structure may be based on representative committees in the board or company style to monitor financial and management progress. The aim should be to avoid conflict and to achieve the advantages referred to earlier.

Political inter-action

To become a successful tool of education, networking must become socially acceptable. It must be 'sold' as something which will bring tangible benefit to the community. It will often be necessary to demonstrate that despite its diversity and apparent complexity, its main aim is to achieve equality of educational provision. This 'selling' task must be aimed not only at teachers, educational planners and parents but most of all at politicians. Unless they are convinced, the right decisions will not be taken. This means changing attitudes to achieve a positive response through the provision of the right kind of information, good publicity, and the careful use of the media.

It is important to recall that it is better for those who are seeking to achieve change to have built sound links with politicians before change is needed. The machinery for communication and reinforcement should already be there and not have to be specially manufactured for the occasion. Political change often comes from providing politicians with material for debate which makes them look good, innovative and constructive. The right 'connections' are very important. If success does not look likely from this approach, then the politician may have to be reminded forcibly of the consequences of inaction.

BUILDING IMPLICATIONS

Because the possible combinations of networking are numerous, so the building implications are equally diverse. This report will not attempt to comment on the particular building implications of new information technology (which may well be a large part of future networking). This was the subject of the Dunblane Seminar in Scotland in September, 1985 and a report is available from the PEB Secretariat. (2)

In general the aim will be to make economies in building costs through networking techniques, for example in the provision of certain specialised facilities for common use by two or more schools, or by the incorporation of community facilities. If these are in the school then there will be a more intense use of the building and if the facilities are outside the school, there is a consequential saving on school building capital and running costs. Achieving these solutions has design implications which give rise to a number of opportunities for the imaginative architect.

Small rural schools may be kept in existence because open or distance learning can be provided through a technological network, but the general consensus of the symposium was that the upper secondary school or the technical college (for pupils from 14 or 15 years upwards) is more appropriate for networking because of their specialised needs.

Falling rolls provide more space and curriculum change needs more space - or a rearrangement of existing space. The examination of this problem gives rise to networking possibilities. The growing community use of schools creates a demand on the building facilities which may only be solved by more intensive use e.g. a longer day or weekend or holiday use. This greater accessibility will demand more careful attention to security. The central provision of equipment will require design solutions for storage, for delivery and for use. All of this suggests that school buildings may have to be designed to be more flexible and multi-functional. This is easy to say, but careful research and publicity for good examples and case studies would be appreciated by those faced with the practical difficulties of designing facilities.

One of the working groups identified three types of space which could be present in a network of schools, namely:

- a) 'defensible' space - 'owned' by each school and not available for open use by other network members.
- b) 'offered' space - 'owned' by each school but made available to other network members, that is, offered for negotiated shared use.

2. James Linn and Martin Garden, "Building Implications of New Information Technology", Document for General Distribution, OECD/PEB, Paris, February 1986.

- c) 'network' space - jointly owned by the network.

The quality of co-operation and interaction in a network would be enhanced if an appropriate balance of all three types of space existed in it.

The same group illustrated the potential of networking in considering two different approaches to the provision of school buildings in an area which could be urban or rural:

The aggregated approach: a large school (e.g. 500 places, ages 5-11).

Economies of scale would enable specialist spaces to be provided on site, and a broader range of curriculum. But the school would perhaps be impersonal because of size and difficult to modify as enrolments fluctuate.

The dispersed approach: a network of small schools (e.g. of 80 places each, ages 5-11).

The schools would be linked with a mobile service and new information technology to a central school (e.g. 150 places) with specialist facilities which could be either central or dispersed (such as community resource centre, sports fields, etc.).

On balance, this latter dispersed approach is favoured, provided the network which is established is effective.

SUGGESTIONS FOR ACTION

The following proposals were made by participants at the Symposium:

- a) that PEB should publicise **good examples** of networking in different countries, to help change attitudes towards this cost-effective sharing approach;
- b) that PEB should consider organising a meeting of **top-level decision-makers** (administrative and political) to inform them and 'educate' them about the building implications of their policy decisions;
- c) that any research results in Member countries into the design of **multi-functional buildings** as elements of a network should be made available to other Member countries through PEB;
- d) that PEB should consider the scope for a detailed study of building-related aspects of transport or **mobility** such as the movement within a network of meals, equipment, learning materials, pupils and teachers, etc.;
- e) that research should be carried out into the design and management of **central stores** of equipment, learning materials etc., including storage, security, location, transport and delivery to the user;

- f) that a complete reappraisal of **time-tabling** techniques should be carried out on an international basis by a body such as OECD. Increasing computerisation, more flexible curricula, life-long education and the community use of buildings, together with networking practice will make this a matter of urgency;
- g) that central and local governments consider **financial incentives** to encourage network development where this provides a number of the advantages listed earlier;
- h) that education authorities should review **legal and administrative barriers** which prevent or inhibit the wider use of schools by the community or networking systems.

SCHOOLS AS PART OF A NETWORK OF LEARNING FACILITIES

Background paper for the symposium

by

John Mayfield

Introduction

This is a discussion paper. The aim is to raise questions, identify and clarify problems, and to assist those involved with educational building to think through both the concept and the practical implications of viewing each school* not only as a place with its own identity but also as a component of a network of educational and social facilities.

This view of each individual school as something more than an isolated, self-contained institution is not new. The connections and the interactions between schools, and between schools and the community has long been recognised. In recent times, however, it has received greater emphasis and as the network concept has developed a number of new opportunities and problems have attracted the attention of those involved in educational building policies. While the main focus of this discussion paper will be on the building aspects of network development, the associated aspects of human resources, funding, curriculum and network management will also be important considerations.

The paper addresses five main themes:

- . Why has the concept of the school as part of a network of learning facilities acquired such prominence?
- . What general building implications emerge from a study of selected examples of operating networks?
- . In what ways are the new technologies affecting the operation of educational networks?
- . In what ways can the building aspects of educational networks be best managed?
- . How can authorities best plan for the establishment and on-going development of educational building networks?

The context - the emergence of the network concept

In most, if not all, participating countries high levels of school building activity occurred in the late fifties through to the early seventies. In general, countries experienced strong economic growth and were optimistic about their economic futures. There was a pervasive confidence about the links between investment in education and the future prosperity of both the nation and the individual. In the rapid development of new suburbs and provincial towns, there was a ready acceptance of the importance of the new school building complete with what was then regarded as the full range of basic and specialist learning facilities.

* In this paper, the word "school" should be taken in its widest sense, to include all types of educational institutions below higher education.

In many respects schools were designed, located and built as complete self-contained institutions. There was relatively little consideration given to the prospects of enrolment fluctuation and/or change in the content or methodology of the curriculum. Schools were considered as "islands", complete in themselves, often surrounded in a mystique which separated them from their communities and from other educational institutions.

The development of the individual identity and autonomy of each school was encouraged by educational authorities and to a degree this development depended more on competition between schools than joint action and co-operation. For example, the decision to build a new gymnasium at one school was more likely to lead to demands for a new gymnasium at nearby schools than to lead to joint use of the new facility.

Many of the characteristics of this period of demographic and economic growth have changed and, as a result of these changes in the policy context, a different balance is being sought between the concept of a "school as an island" and a school as an interactive and interdependent part of an operating network of educational institutions.

One of the more obvious changes has been a significant reduction in the level of capital funds available for educational building. In many cases the expectations which schools and their communities have held for additional buildings have given way to the realisation that redevelopments to accommodate such activities as music, drama, technical studies, etc., cannot be provided in the foreseeable future.

At the same time as economic constraints have reduced the likelihood of each school gaining additional buildings, the curriculum demands for specialist facilities have expanded at all levels of schooling. In the early years of schooling and at primary level, the need for libraries, access for the disabled, activity areas, science facilities etc., especially in the older school buildings, has increased at least partly because of the existence of this type of specialist space in many new school buildings. At the secondary and post-compulsory levels, the rising importance of the vocational component of education has created an urgent demand for facilities which, even in the most buoyant of economic climates, would be very difficult to meet.

Enrolment decline, which has replaced overall enrolment growth as a characteristic of the school building context, has had mixed effects. On the one hand the existence of overall surplus facilities has tended to weaken the arguments for, and thus the flow of, necessary new capital so reducing the opportunities for a school to acquire all the facilities it needs. On the other hand, the emergence of spare space within a school has provided the **opportunity** for redevelopments which have varied from the well planned to the makeshift.

A further contextual change has occurred which in some ways has been more subtle than the changes in demography, economics and curriculum aspects of school building. The mystique which once tended to isolate each school from other schools and from the community has gradually been broken down. The entry of parents and other members of the wider community into the school is matched by the more frequent movement of students and teachers beyond the school "walls". There is a greater awareness and acceptance of the interaction of the school and its community and a number of well documented consequences have emerged for the design and operation of the buildings.

Recent developments in communication technology promise much in the context of network development. Computer networks and innovative uses of telecommunications have opened up the possibility of groups of urban, as well as rural, schools sharing limited teaching resources. Once this distance education mode of learning was restricted to students who were isolated from any form of educational facility.

Some observers would also claim that there is a growing preference for small rather than large schools to be built. The arguments in favour of smaller school size with buildings of a more domestic scale seem to derive from a reaction to the large institution often perceived as threatening, impersonal and too closely identified with the mass delivery of goods and services to a community seeking a return to the attributes of the "village" as compared with the "metropolis".

It would seem, therefore, that there are characteristics in the context of educational building which would lead away from the large self-contained school with a complete set of purpose built specialist facilities, to the notion of a school of smaller size still with its own identity and autonomy, still very much serving its own local community, but with a much greater sense of interdependence on other schools and on the learning facilities which exist in the community.

It is this balance between independence and interdependence which is at the centre of the concept of the school as a component of an operating network of educational facilities.

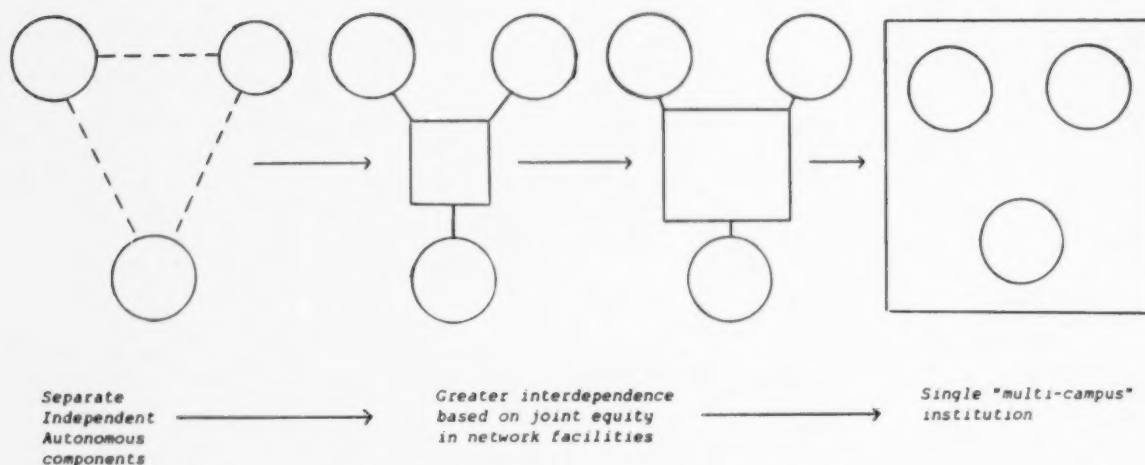
Some general characteristics of networks

Networks as discussed in this paper are very broadly defined and any study of examples of operating networks quickly reveals that there is a very wide range, formal and informal, to be considered.

At one end of the range are examples of groups of schools between which informal and often incidental co-operation occurs. Co-operation may take the form of an annual combined musical evening or sporting event; it may be limited to the exchange or loan of equipment, or extend to the sharing of a specialist facility such as drama facilities. Such examples are frequent and have relatively little to offer in terms of the building implications of network development. Towards the other end of the range much more complex examples can be found which have very considerable implications for educational building.

One useful classification of co-operating networks is illustrated in figure 1. At one end of the continuum we have separate, independent components such as schools, community facilities, further education colleges, etc., between which informal and often temporary co-operative arrangements may be developed. At the other end of the continuum, the autonomy of the individual components is subsumed under the single authority of one possibly multi-campus institution such as a university or college of advanced education.

Figure 1: A possible classification of co-operative networks



Within the extremes of the continuum lie a variety of possibilities within all of which three main characteristics can be discerned.

- . Buildings and other facilities which are part of the identity of individual components and give each component a stake or equity in the network operation.
- . Buildings and other facilities which are jointly owned and/or operated on behalf of the entire network.
- . Some degree of formal management structure through which the planning, development and operation of the network is conducted.

Take, for example, a group of three primary schools and one central secondary school. Is it better to consider the secondary school as the sole focus for the addition or redevelopment of specialist facilities, or is it important to ensure that each element in the network shares in building redevelopment? Is it an advantage to have one centre to which all students in the network travel or is it better that each component develops a speciality that is complementary to the special aspects of the other network components? Is it preferable to operate one centre on behalf of all elements of the network so that the logistic problems of extended hours, security, transport, printing, record keeping etc., can all be managed in the one location instead of in each of the co-operating schools?

One feature of the network concept which distinguishes it from the approach usually termed "rationalisation" is that competition between schools for resources, enrolments and new facilities is significantly reduced. In a

situation in which inter-school competition for buildings is high, the planning process is inhibited by a concern that building in one component must be duplicated in all others if authorities are to be perceived as even-handed. In the ideal consortium, the duplication of specialist facilities would be limited so that all members of the consortium could share the maximum diversity of educational building opportunity. Nevertheless, it is as well to recall that one characteristic of schools as part of a network is that the identity of each component should be maintained and enhanced.

To concentrate all specialist facilities and to focus building development plans exclusively on the hub or centre of the network seems likely to engender a dependence on the centre at the expense of interdependence between co-operating members of the network. It is possible that, as a general rule, the network will be stronger and operate more effectively if each school component has its own unique contributions to make.

One of the advantages of a network approach to the provision of educational buildings is that once the principle of operating "off-campus" is established a wide range of community facilities become potential learning centres. Instead of the traditional expectation that all necessary buildings and equipment will be provided as permanent facilities on campus, local museums, libraries, enterprises, factories, entertainment and recreational facilities begin to emerge as legitimate components of the educational network. As vocational education has assumed greater importance in the post-compulsory years, many schools have entered partnerships with further education colleges, and with private enterprise, to establish student access to work experience, credit carrying training courses and pre-apprenticeship experience. Often schools are able to take advantage of seasonal downturns in farming or business activity to gain access to plant and equipment which is not available in school. These joint ventures between industry, commerce and schools have many advantages. They respond to building demands which cannot be met on an individual school basis; the courses have the added relevance of occurring in the work place and the interaction between people in industry and those in education leads to greater mutual understanding.

Is it practical to plan for educational facilities which take greater advantage of this joint approach between enterprise and the education sector? Should the network which might involve a factory and nearby schools be extended to link with rural schools whose students are otherwise excluded from this type of opportunity?

Examples of networks which include the commercial and industrial sectors as well as other educational human service sectors such as child care, health, etc., raise a number of important financial questions. Is it simply a matter of "the user pays" when education extends beyond the school facilities to facilities owned and operated by other sectors? What incentives might encourage a factory owner to make his premises available for courses at reduced rates? Is there any aspect of the network of educational facilities which might be attractive to industry or commerce and used in return for access to the workplace? Is it feasible to plan new buildings or the redevelopment of existing facilities so that the school is seen as much as an extension of enterprise as the factory is seen as an extension of the school? The prospect is not so unlikely as it may once have seemed. Some of the new patterns of work developing as a result of the impact of new industrial technology suggest that small decentralised firms which can rapidly adapt

their processes and products are likely to have an advantage over the large scale mass assembly lines. If this is so then the workshops of many schools may well have a legitimate place in a network which includes school and industry.

The concept of a consortium or co-operating network of schools can be a particularly powerful idea in a group of schools in which enrolment decline is occurring. If the schools are considered as individual institutions competing for enrolments and the prestige and resources which usually flow from higher enrolments, then under-used spaces in any of the schools become a burden to the authorities responsible for the school system. Premises related expenditure, which seldom declines with declining enrolments, cannot be justified and redevelopment in any one of the schools is inhibited by the inevitable claims from the other schools for similar treatment. Despite the now familiar political opposition the objective, often frustrated, is to proceed towards rationalisation by closure of under-used accommodation. In a community in which decline is already a feature, the closure or withdrawal of educational buildings is a further disadvantage.

This situation can be turned around to the considerable educational and social advantage of the community if the separate schools begin to operate as a single co-operative network. Under-used spaces are no longer perceived as waste to be eliminated, but as opportunities for the development of specialist facilities which do not have to be replicated in each of the network components. Divisive efforts aimed at closure are replaced by concerted efforts to keep facilities open so long as they are seen as genuine contributions to the educational and community partners in the network.

Furthermore, when the competition between network schools is replaced by co-operative action which does not threaten but enhances the identities of each network member, the reluctance to sell, lease or otherwise take out of commission high revenue cost buildings tends to be reduced. Once the viability of a component is assured by membership of the consortium, actions which once threatened existence tend to become contributions to enhanced existence.

This aspect of network development is seldom as simple in practice as it seems to be in theory, but experience has shown that when a group of schools are engaged in a "closure" decision the climate of discussion is often much less rational than when they are engaged in decisions about which elements of the network should be opened up.

From a practical point of view, one of the first issues to be considered is the organisation of instructional timetables within the cluster. The problem is that either students must move between various elements in the network or teachers must move. If specialist facilities are involved, then there must be time and transport to enable teachers and/or students to move with minimal inconvenience and this poses considerable problems for successful network operation.

In the absence of modern communication technology which we will consider in the next section, experience suggests that three guidelines are useful in the management of the two related problems of timetabling and transport.

- . Blocks of time, e.g. whole or half days rather than the relatively short 40 minute lessons are an advantage.
- . If possible, the need for regular travel between components of the networks should be restricted to senior students beyond compulsory age.
- . Timetabling on a semester rather than a whole of year basis is an advantage with courses repeated in consecutive semesters to increase choice.

Guidelines such as these can be helpful in solving time and transport dilemmas but these two aspects of network development remain as two of the most intractable problems.

Is it possible to reduce the inconvenience and sense of disruption of travelling to different components of the network by ensuring that staff and students feel "at home" when away from their home school? Added storage, cafeteria and preparation areas seem likely to be of assistance in this regard and a number of building implications follow. Meeting places, message boards, secure areas for student belongings and safe access and parking areas for intra-network transport are examples of necessary modification to existing facilities.

The main hope, however, is that the use of modern communication technology and the introduction of methodology derived from distance education will significantly reduce, if not eliminate, the problems of timetable and transport within a network.

The contribution of new information technology

For many years children living in remote and isolated locations have gained much of their schooling with the aid of distance education techniques. Originally the only mode of instruction involved "correspondence lessons" delivered by post to be completed under the guidance of parent or tutor. The invention and development of radio added a further dimension to distance education and in countries such as Australia and New Zealand, "Correspondence Schools" and "Schools of the Air" became the centres of networks of learners (rather than schools) whose homes were separated by vast distances.

Two very significant changes have occurred in this mode of teaching and learning. As communication technology has advanced the printed correspondence assignments have been augmented by a wide range of non-print materials. Audio and video tapes have become commonplace, access to satellite radio and television transmissions has increased, access to electronic data banks and computer networks has begun to occur via much more reliable tele-communication pathways and the associated use of facsimile machines, video-tex and similar information technology. Interactive video, TV telephones and a range of other advanced technology seems either on or just beyond the horizon. This technological revolution appears to have much to offer the distance education mode.

Figure 2: A learning network in operation



a) a music theory lesson at a city special music school



b) a student at a country school
participating in the same lesson

The second significant change is less obvious but to many of greater importance than the advances in educational communication technology. As transport has become more accessible, both teachers and isolated students are travelling in order to meet more often in a face to face teaching-learning mode. It is now an integral part of distance education for students and itinerant teachers to meet, get to know each other and, as often as possible, to work in a face to face situation.

At the same time as the various forms of communication technology have transformed the education of geographically isolated students, two apparently unrelated trends have brought distance education into even greater prominence.

The curriculum has expanded at all levels of schooling. At the secondary and post compulsory levels the increased emphasis on vocational education has been a major contributor to a much more diverse range of curriculum offerings. Diversity has also increased at primary level where, for example, recognition of the importance of language learning in a multi-cultural society has led to demands for several languages to be offered.

At the same time as the demand for greater curriculum diversity has increased, the phenomenon of enrolment decline and accompanying loss of teacher numbers has tended to contract the range of curriculum offerings. Thus, even in urban areas authorities have had to deal with the problems of students who are in a real sense isolated from particular curriculum offerings and distance education methodology is becoming an integral part of the programme of many urban schools linked into communication networks.

By its very nature, distance education methodology has much to offer the development of a network of school and community facilities. One of the problems, however, is that, traditionally, learning by distance is regarded as a second-best to conventional face to face classroom instruction. There is little doubt, however, of the success of the Open University networks in countries such as the U.K. and Holland, not only in the range and quality of the teaching but also in terms of the greatly increased access provided to students. There seems little doubt that provided the organisation and methodology includes a balance between individual learning, class group learning (either in the one place or by means of telecommunications) and face to face teaching and learning, distance education techniques will play an increasing role.

What then are the building implications? At first glance they may appear minimal but experience has shown that a number of important building and especially equipment problems, need to be considered. Is it better, for example, to construct special rooms in which light and acoustic conditions favour the use of new information technology, or is it preferable for "home" rooms to be adapted? What storage and security arrangements are needed for technology such as video machines, loud speaker telephones, television receivers, etc.? What forms of building construction interfere with radio and television reception and how can the design and equipment of resource centres be adapted so that students anywhere in the network can access information at times which best suit their needs? What changes need to be made to staff facilities given that teachers operating in the distance-education mode will be working with students who are likely to be dispersed throughout the cluster of schools and who, through the use of electronic mail systems will be communicating their answers and their enquiries at times which are not confined to a scheduled "lesson"?

Perhaps the most important building implications follow from the fact that by making full use of modern information technology students are able to gain access to a much wider range of curriculum subjects, some of which will require appropriate facilities to be available. This and other problems are perhaps best illustrated by the following extract from a rural secondary school report on its experience with distance education.

"The school acknowledges that students studying by this method must learn new skills as do the teaching staff. The school also realises that some students find distance education methods very difficult. As a result, the school has decided that it will be compulsory for all Year 11 students contemplating a year 12 course to do at least one subject through the Correspondence School (e.g. Geology, Biology, Mathematics) or one subject in the distance mode through the Further Education Extension College (e.g. Beef Cattle Husbandry, Welding or Introductory Diesel Mechanics). The reasons for this are:

- . to learn organisation skills
- . to learn telephone techniques with adults and other students
- . to learn the best way to use the public library."

The necessity of establishing network links with other schools, further education colleges and with industry becomes clear when the available curriculum choices range from Geology to Beef Cattle Husbandry and Introductory Diesel Mechanics.

Managing the network property

In recent years the creative management of educational assets has gained prominence in a context of tight economic conditions. Property acquisition policies which depend on a relatively high and continual inflow of new capital have given way to policies which still include the addition of new building stock but also aim at meeting educational building needs by the efficient management of existing stock.

One of the main problems which inhibits efficient property management is the fact that many school buildings are the result of planning, design and construction processes which have failed to take full account of the inevitability of change. More than two decades of consistent growth have tended to obscure the inevitability that economic, educational, social and demographic factors will fluctuate over time. Large, monolithic, single purpose buildings designed for particular predictions of curriculum, enrolment and community needs are often very difficult to adapt because the degrees of freedom are very limited. To change, for example, the function of one part of a single large school building often means the whole building must be changed.

In contrast the degrees of freedom are very much greater in a network of individual facilities and a change in function of one component of a network can be achieved relatively easily. Whether it be a cluster of separate schools or an articulated set of separate buildings on the one campus, the property management options seem to be enhanced. The educational "tower" is much more difficult to manage as an adaptable building asset than

Figure 3: A recorder lesson using modern communication technology - students and teacher at a small rural school are linked with a specialist teacher at a metropolitan school



the educational "village" in which leasing, sale, disposal, conversion and relocation are all viable strategies because they can be applied to separate individual components. Thus, from a property management point of view the establishment of educational networks is potentially a great advantage. The more degrees of freedom the greater the options for adaptation to meet new needs.

The question is, of course, who decides what property management strategies will be employed in a network situation in which there is a range of different stake-holders. To a large extent the answer to this key management question depends on the position of the network along the continuum in figure 1. The more informal and incidental the arrangements between the network components, the more property management decisions will be taken by each component. If these decisions are made unilaterally and motivated by competition between parts of the network, then coherent efficient property management will be less likely to be achieved. At the other end of the continuum the question of "who decides" is answered by the fact that the network has become a single multi-campus institution.

For those networks whose characteristics place them between the extremes of the continuum, a number of guidelines for effective decision making have emerged from experience.

- . Establish a network property management committee with formal, legal terms of reference and agreed procedures.

- . Establish clear definitions of what buildings, grounds and equipment belong to the network and what property remains under the aegis of the individual components.
- . Establish formal arrangements (including review procedures) for recurrent property related costs.
- . Ensure that arrangements are in place to deal with proposals for major building development proposed by individual components especially when such developments would have an impact on the network operation.

Once these main structures have been established, a number of potentially significant property management opportunities can be contemplated. Is it possible, for example, to employ a single grounds staff with equipment which can not only maintain the grounds of each school but also earn revenue by operating beyond the network? The scope for rationalisation of duplicated facilities within the shared elements of the network is also potentially large with facilities and services such as printing, library, computing, communications, etc., likely to lend themselves to more efficient management.

The control of premises related costs may also be more practicable given that more efficient use can be made of specialist spaces such as music, technology workshops, gymnasias, etc. If links can be established with local government or industry then the potential for more efficient property management is even further enhanced. Grounds development programmes, cyclic maintenance and minor repairs are examples of property related cost items which can be more economically managed by co-ordination and joint approaches by the network participants.

It is worth noting, however, that one important aspect of network development is the maintenance of the identity and autonomy of each co-operating component. This feature which distinguishes the network approach from rationalisation strategies involving closure and consolidation may well be a limiting factor in achieving maximum results from the management of the network's educational buildings.

Educational building management is very much dependent on the management of curriculum, timetable and teaching resources and a number of important questions arise when the relationship between these management structures is considered. For example, is it better to have one Principal for the network or should each component retain its Principal, school board and administration staff? Under what circumstances is it an advantage to have a property manager with a single network property management team? Who might employ such a manager and what would his relationship be with the Principal(s), the various school parent bodies, community institutions, etc.?

Again, each network will have unique characteristics but there seems likely to be a general advantage and the potential for significant improvement in property management as we move from a number of separate, competing and independent institutions to a consortium in which the various partners each have a stake and a clear set of management guidelines to maximise educational, social and economic opportunities.

The network concept - implications for the future

The concept of the school as a component of a network of educational buildings seems to offer a number of important advantages in the context of educational building policy. The potential exists for:

- . enrichment of curriculum choice beyond that which could be offered by schools acting individually;
- . greater opportunities for improved property management over time given the inherent adaptability of the network structure;
- . enhanced sense of identity within individual components;
- . the development of a climate of co-operation and joint action rather than competition and independent action;
- . a sense of scale which is less impersonal than that of the large school;
- . a retention of all the benefits of larger scale, provided access to all key parts of the network can be arranged.

From another point of view the network concept offers authorities an alternative to the problematic approaches of closure and consolidation when enrolments decline. For the rural and isolated communities, the concept offers a degree of access to what would otherwise be unavailable educational opportunities.

There are also many practical problems associated with the network concept. Travel, communication, timetabling, the pastoral care of students, inconvenience for teachers, etc., are practical matters which will make some of the apparent advantages of network development difficult to achieve. On balance, however, the concept appears to have much to offer and, if this is so, the implications for new as well as existing school building provisions need careful consideration.

ANNOTATED LIST OF DOCUMENTS PRESENTED

Except where otherwise stated all these papers are in English; copies can be obtained from PEB/OECD, 2 rue André-Pascal, 75775 Paris Cedex 16, France.

PEB

1. "Schools as part of a network of learning facilities: implications for educational building" by John Mayfield, OECD/PEB, Paris, October 1986 (26 pp) - this was the discussion paper for the symposium, the main text of which is reproduced as Annex A of this report (original English, also available in French and Spanish).

AUSTRALIA

2. "The ACT Schools Authority network" - a note by the Australian Capital Territory Schools Authority (2 pp) describing the computer network used in administration of the authority's schools.

AUSTRIA

3. "School - an isolated undertaking", Federal Ministry of Education, the Arts and Sports (4 pp) - a report by Manfred Hinum on a seminar held in Austria in June 1986 on the school's role in broader economic and social life, and in particular in lifelong education.

BELGIUM

4. Note by the State School Building Organisation (Dutch-speaking sector), Ministerie van Onderwijs, Brussels, December 1986 - describes current developments in school provision, including administrative decentralisation, the extent of co-operation between schools and school systems, and the introduction of new technology. (French only)

FINLAND

5. A general background note (2 pp) on school building in Finland.
6. A note (4 pp) on vocational education and co-operation with industry in traineeships, updating of teachers knowledge and provision of equipment.

7. "A company building a gymnasium for the use of five schools in Lahti, Finland" by Raimo Olkkonen (2 pp) - a description of a joint venture to provide sports facilities.
8. A note giving information on Lahti and its school system, by Markku Marjamaa (2 pp).

NETHERLANDS

9. "A facilities' network in the Netherlands: an example drawn from a rehabilitation area in the City of Rotterdam", I.C.S. paper 6, Rotterdam, November 1986 (7 pp) - describes educational and social facilities in the "Oude Westen" district.

SPAIN

10. "Current developments in Spanish education", Eurydice European Unit, Madrid, October 1986 (16 pp) - an information paper describing the administrative structure and developments in pre-school and compulsory education.
11. "Learning networks from the viewpoint of adult education" by José Antonio Fernandez, Ministry of Education and Science, Madrid, November 1986 (7 pp) - describes approaches to the development of adult education in Spain, with particular reference to the region of Murcia.
12. "Experiences in vocational training of co-operation between colleges and business", Sub-directorate General of Vocational Training, Ministry of Education and Science, Madrid, November 1986 (11 pp) - describes collaboration between education and industry in vocational training as a result of the 1982 Social and Economic Agreement between Government, trade unions and employers associations.
13. "Interaction between Council and teaching bodies in the local authority education plan", by Maria Urrea (Zaragoza City Council), Madrid, November 1986 (5 pp) - describes co-operation and consultation between the local authority, the Ministry of Education, parents' associations and school boards in planning innovative programmes.
14. "The network of state schools and its co-ordination by the local authority" by Carmen Ferrero Torres (Getafe Town Council), Madrid, November 1986 (7 pp) - presents experience in co-ordinating the use of schools, outside school hours, as a venue for a range of services and activities in an industrial town (Getafe) with high unemployment and low levels of educational attainment.
15. "The present situation and future prospects of network policy in Spain, from the point of view of programming", Subdirectorato General of Investment Programming, Ministry of Education and Science, Madrid, November 1986 (10 pp) - discusses developments in school building since 1960 in relation to demographic pressures and educational trends, and identifies examples of networking and considers scope for rationalisation in future.

16. "Network of Schools in Ballobar (Huesca), Spain", General Directorate for Teaching Centres, Ministry of Education and Science, Madrid, November 1986 (24 pp) - a discussion paper on an experiment in resource-sharing in a sparsely-populated area which describes the characteristics of the area, the creation of a resource centre, the co-ordination of the experiment and the specific activities undertaken.
17. "Experiencias en formación y cooperación entre padres/instituciones y centros escolares" (some experiences in co-operation between parents' associations and educational institutions and centres), Confederación española de asociaciones de padres de alumnos, Madrid, November 1986 (9 pp) - outlines the role played in educational management by parents' associations, in particular the opening of the school to the community and the education of parents themselves.

SWEDEN

18. "Resource centre in Ljungby" (4 pp) - a leaflet with a plan and brief description of a jointly-provided technical resource centre at an upper secondary school.
19. "Engineering technology centre - Karlskrona", by Bo Hjelm (14 pp plus leaflets) - notes on the engineering technology centre in Karlskrona which jointly serves industry and education and was the subject of a presentation at the symposium. Also included is background information on Karlskrona and on Uddcomb, the company on whose premises the centre is located.

TURKEY

20. "The organisation and structure of the educational system, apprenticeship and vocational training", by A. Remzi Sezgin, Ankara, November 1986 (5 pp) - outlines the organisation of education in Turkey, with particular reference to new legislation on apprenticeship and vocational training.

UNITED KINGDOM

21. "North Manchester College" by Ron Mitson (11 pp plus leaflets) - notes and background information on North Manchester College which incorporates an 11-16 secondary school, post-secondary education and training, and a wide range of community facilities, and which was the subject of a presentation at the symposium.
22. "The Alford Centre" - background information (15 pp) plus a brochure describing an information technology centre in a small town in Scotland; this was the subject of a presentation at the symposium.